The Examiner has rejected claims 1-9 and objected to the specification as failing to provide an adequate written description. The Examiner states that the meaning and significance of the "servo-tomo function" are not defined. Applicant disagrees. The servo-tomo function is described, inter alia, on page 2 of the subject application as follows:

> "Systems operated in accordance with a servo-tomo function do not mechanically fix or maintain the same relationship between the x-ray tube and the detector. Instead, the servo-tomo function controls movement of the x-ray tube and the detector relative to one another, but such movement is not identical. The servo-tomo function allows the x-ray tube and the detector to move in opposite directions, similar to linear tomography, but also to move at different speeds and distances."

Additionally, on page 6, the operation of the system is described while utilizing the servo-tomo function as follows:

> "The x-ray tube 102 and the detector 112 illustrated in Figure 2 are not mechanically connected in a manner that they mirror movement of one another. Instead, the relationship between the x-ray tube 102 and the detector 112 is maintained by the system controller 128. Thus, when an exposure is taken utilizing the servo-tomo function, the motion controller 132 may move the x-ray tube 102 and the detector 112 at different speeds and distances."

Therefore, Applicant believes that the meaning and significance of the servo-tomo function has been defined, and thus the rejection of claims 1-9 and the objection to the specification should be withdrawn.

Next, the Examiner rejected claims 1-9 under 35 U.S.C. § 103 as being unpatentable over Khutoryansky. Applicant traverses this rejection. Claim 1 concerns a method for acquiring digital x-ray images. The method includes identifying scan parameters designating slices of interest of a patient, scanning the patient in a first direction utilizing a servo-tomo function based on the scan parameters to obtain a first x-ray image, and scanning the patient in a second direction utilizing the servo-tomo function based on the scan parameters to obtain a second x-ray image. Khutoryansky does not teach or suggest the use of the servo-tomo function to acquire x-ray images in first and second directions, or the claimed identifying step wherein scan parameters for more than one slice of interest are identified. In contrast, Khutoryansky teaches a radiographic room capable of

accepting the scan parameters for one image at a time, and then acquiring a single conventional radiographic or linear tomographic image.

It would not have been obvious to modify Khutoryansky's system in a manner that would render obvious the claimed invention because Khutoryansky's system does not have the capability of storing scan parameters for successive slices of interest. As described in columns 4-6, scan parameters are entered on the universal control panel using various system switches. Only one value for each scan parameter may be entered at one time. (col. 5, lines 17-62) Switches such as Longitudinal LEFT and RIGHT and Rotation CW and CCW are available as indicated by the Examiner, however, scan parameters for these switches are neither entered nor selected. Rather, the switches enable the manual movement of the table bucky and x-ray tube.

A typical tomographic acquisition sequence is also discussed in columns 7 and 8 of Khutoryansky. The operator first selects TOMO MODE and ensures that the components are in their proper positions (col. 7, lines 18-35). The operator then selects the SWEEP ANGLE and either FAST or SLOW TOMO speed (col. 7, lines 40-47). "The operator also selects the desired imaging plane" (col. 7, lines 47-48). An x-ray exposure is then taken. "After each tomographic exposure, the system returns to the CENTER position." (col. 8, lines 10-11) As stated above, Khutoryansky does not teach or suggest the ability to select the direction of travel during the scan for either the x-ray tube or the table bucky, nor does the system wait at one end of its travel in preparation for the next x-ray exposure. Therefore, it would not have been obvious to modify the system of Khutoryansky to acquire more than one x-ray image in more than one direction.

Furthermore, Khutoryansky's system does not teach or suggest acquiring data in a servo-tomo mode. Rather, a universal radiographic room providing the capability to conduct conventional radiographic examinations or linear tomographic examinations (col. 2, lines 29-32) is described, and "an x-ray generator equipped with a generator control that selects between conventional radiographic and linear tomographic modes of operation is provided." (col. 1, lines 49-52)

It is submitted that Khutoryansky does not anticipate nor render obvious the dependent claims as well. Claim 3 concerns calculating first and second preparation positions located on

opposite ends of a scan range over which the first and second scans are acquired. Claim 4 concerns initiating scanning in the first direction beginning at a preparation position located at one end of a scan range and initiating scanning in the second direction beginning at the preparation position located at an opposite end of the scan range. Because Khutoryansky teaches a system in which scan parameters for only one x-ray image may be entered at a time, and then returns the system back to the CENTER position after each scan, first and second preparation positions, located at opposite ends from each other, would not be calculated or used by the system of Khutoryansky.

Claims 6, 7, and 10-21 have been rejected under 35 U.S.C. § 103 as being unpatentable over Khutoryansky in view of either Lin or Kruger. Claim 10 concerns a method for displaying digital x-ray images in a multi-image format. The method includes identifying scan parameters designating multiple slices of interest, acquiring a series of images where each image in the series corresponds to a slice of interest, displaying the images simultaneously as each image is acquired, and after the acquisition and simultaneous display of each image of the series of images, halting the acquisition until reinitiated by an operator. Neither Lin nor Kruger teaches or suggests, among other things, the steps of identifying scan parameters for multiple slices of interest or displaying the images simultaneously as each of the images is acquired.

Instead, in Lin's system, the x-ray tube travels around a trajectory at a set radius. A series of images are acquired as the x-ray tube travels the first 180 degrees along the trajectory and then the series of images are summed to build the first slice in a first slice memory 52. (col. 4, lines 46-48) The slice data is then converted by the video processor 54 for display. As stated previously, Lin does not teach or suggest displaying images simultaneously as the images are acquired. Instead, "preferably, the x-ray source 10 is rotated at 15 rotations per second such that there is a frame rate of 30 images of the slice generated per second to match a standard video image frame rate." (col. 4, lines 59-62) Therefore, Lin teaches displaying the same slice as a constantly updated video frame. Furthermore, as the radius is not modified during the scan, the same slice of interest is displayed, rather than displaying a single slice as an image while simultaneously displaying a different single slice as a different image. Thus, Lin is silent to the step of identifying scan parameters to designate multiple slices of interest. Also, as Lin acquires many images in order to display a slice at a frame

rate such as 30 frames per second, Lin is silent to the step of halting the acquiring step after the acquisition and simultaneous display of each image.

Kruger also teaches a system wherein only one plane is imaged at a time. "A limitation to the described imaging approach is that although it can be implemented in real-time, only one plane is imaged." (col. 5, lines 4-6) Therefore, Kruger is silent to the steps of identifying scan parameters designating multiple slices of interest and acquiring a series of images corresponding to the multiple slices of interest. "The apparatus 100 includes a conventional circular or elliptical tomography mechanism 15 modified for fluoroscopic application." (col. 3, lines 22-24) Therefore, the system of Kruger is best described as utilized for fluoroscopy, and Kruger states that "the series of frames are temporally filtered and then displayed." (col. 2, lines 21-22) Kruger is silent to the steps of displaying the images simultaneously as each of the images is acquired, and does not teach or suggest the step of halting the acquiring step after acquisition and simultaneous display of each image in the series of images. It is therefore respectfully submitted that neither Lin nor Kruger make up for the deficiencies of Khutoryansky as discussed above in relation to claim 1, and that modifying the system of Khutoryansky with the teaching of either Lin or Kruger, or any combination of the three teachings, would not render obvious the Applicant's invention.

Turning to dependent claims 6 and 7, claim 6 depends from claim 1, and further includes displaying the first x-ray image after scanning in the first direction and, after scanning in the second direction, co-displaying the second x-ray image with the first x-ray image in a multi-image format. Claim 7 also depends from claim 1, and includes saving the image in an image storage device, and displaying the image on a multi-image format display. As discussed previously, neither Lin nor Kruger teach or suggest using a multi-image format display to display images simultaneously as they are acquired. Hence, claims 6 and 7 are non-obvious.

Dependent claim 12 concerns prompting the operator after each acquisition to change previously identified scan parameters designating a slice of interest not yet acquired. Dependent claim 13 concerns redefining previously identified scan parameters designating a slice of interest not yet acquired after each acquisition. Because neither Lin nor Kruger, alone or in combination

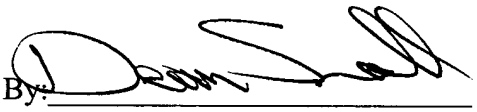
with Khutoryansky, teach or suggest defining scan parameters for multiple acquisitions, the claims to changing or redefining previously identified scan parameters are not rendered obvious.

It is respectfully submitted that the pending claims define allowable subject matter. Should anything remain in order to place the present application in condition for allowance, the Examiner is kindly invited to contact the undersigned at the telephone number listed below.

Please charge any additional fees or credit overpayment to the Deposit Account of McAndrews, Held & Malloy, Ltd., Account No. 13-0017.

Respectfully submitted,
McANDREWS, HELD & MALLOY, LTD.

Date: February 25, 2002

By: 
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APPENDIX

AMENDMENTS TO THE CLAIMS

10. (Amended) A method for displaying digital x-ray images in a multi-image format, said method comprising:

identifying scan parameters designating multiple slices of interest from a patient anatomy;

acquiring a series of images, each image in said series of images corresponding to [said multiple] a slice[s] of interest;

displaying images simultaneously as each of said series of images is acquired; and

after acquisition and simultaneous display of said each image in said series of images, halting said acquiring step until reinitiated by an operator.

12. (Amended) The method of claim 10, further comprising after each acquisition, prompting the operator to change previously identified scan parameters designating said [a] slice of interest not yet acquired.

13. (Amended) The method of claim 10, further comprising redefining previously identified scan parameters designating said [a] slice of interest not yet acquired after each acquisition.